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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,792	08/29/2001	Paul A. Farrar	M4065.0382/P382-A	5268

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EXAMINER

LEE, EUGENE

ART UNIT PAPER NUMBER

2815

DATE MAILED: 09/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/940,792

Applicant(s)

FARRAR ET AL.

Examiner

Eugene Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 46-48, 51-56 and 58-81 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 46-48, 51-56 and 58-81 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 August 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 56, 58, and 59 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamamoto et al. 5,963,838. Yamamoto discloses (see, for example, FIG. 47) a semiconductor device comprising a substrate 21, and wiring layer (conductive material) 32.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 46, 51, 52, 54, 55, 60, 61, 72 and 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. '838 as applied to claims 56, 58, and 59 above, and further in view of Yamagata et al. 5,679,475 and further in view of Sato et al. "A New Substrate Engineering for the Formation of Empty Space in Silicon Induced by Silicon Surface Migration." Yamamoto does not disclose a monocrystalline substrate. However, Yamagata discloses (see, for example, column 1, lines 51-53) that monocrystalline substrates have good controllability of crystal orientations and less crystal defects. Therefore, it would have been obvious to one of

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ordinary skill in the art at the time of invention to use a monocrystalline substrate in order to have good controllability of crystal orientations and less crystal defects.

Yamamoto in view of Yamagata does not disclose a spherical pattern. However, Sato discloses (see, for example, column 2, lines 4-7) a spherical pattern as one of many patterns that are formed within a substrate. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use a spherical pattern in order to form a buried pattern that is functional under the surface of a substrate. Also the use of a spherical pattern does not provide any critical or unexpected results to the applicant's invention. Rather, it is merely an obvious design choice determinable by routine experimentation. In *Aller*, the court stated, "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In *re Aller*, 220 F.2d 454, 456 105 USPQ 233,235 (CCPA 1995).

8. Claims 47, 48, and 76 thru 81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. '838 in view of Yamagata et al. '475 in view of Sato et al. "A New Substrate Engineering for the Formation of Empty Space in Silicon Induced by Silicon Surface Migration." as applied to claims 46, 51, 52, 54, 55, 60, 61, 72, and 75 above, and further in view of Kenney 5,583,368. Yamamoto in view of Yamagata in view of Sato does not disclose a second buried conductor pattern having a pipe-shaped or plate-shaped pattern, and said first buried conductor pattern being located below said second buried conductor pattern. However, Kenney discloses (see, for example, FIG. 1g) subsurface structures (for contacts to and connectors between devices) comprising trenches of varying depths. It would have been obvious

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to one of ordinary skill in the art at the time of invention to have a second buried conductor pattern having a pipe-shaped or plate-shaped pattern, and said first buried conductor pattern being located below said second buried conductor pattern in order to form multiple contacts within a semiconductor device and form a more intricate device. In addition, the use of a spherical pattern with a plate-shaped or pipe-shaped pattern or any other combination of patterns within the same device does not provide any critical or unexpected results to the applicant's invention. Rather, it is merely an obvious design choice determinable by routine experimentation. In *Aller*, the court stated, "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In *re Aller*, 220 F.2d 454, 456 105 USPQ 233,235 (CCPA 1995).

9. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. '838 in view of Yamagata et al. '475 in view of Sato et al. "A New Substrate Engineering for the Formation of Empty Space in Silicon Induced by Silicon Surface Migration" as applied to claims 46, 51, 52, 54, 55, 60, 61, 72, and 75 above, and further in view of Witek et al. 5,291,438. Yamamoto in view of Yamagata in view of Sato does not disclose said monocrystalline substrate being a germanium substrate. However, germanium is one of many conventional materials used in the fabrication of semiconductor devices. In column 3, lines 63-65, Witek discloses germanium as a substrate material. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use a germanium substrate in order to form a substrate that is capable of supporting semiconductor devices. It has been held to be within the general

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skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

10. Claims 62 thru 64, and 67 thru 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. '838 as applied to claims 56, 58, and 59 above, and further in view of Tsu et al. 6,294,420 B1. Yamamoto does not disclose a processor system and a circuit coupled to said processor comprising a conductive structure. However, Tsu discloses (see, for example, FIG. 4C and FIG. 6) a memory array comprising a processor coupled to additional circuitry. In column 8, lines 61-*, Tsu states that the memory array may be embedded into a larger integrated circuit device wherein the memory array is included with control circuitry on the same integrated circuit. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to include the semiconductor device of Yamamoto in view of Yamagata into a memory array like Tsu in order to utilize the device in memory circuits.

11. Claim 65 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. '838 in view of Tsu et al. '420 B1 as applied to claims 62-64, and 67-71 above, and further in view of Sato et al. "A New Substrate Engineering for the Formation of Empty Space in Silicon Induced by Silicon Surface Migration." Yamamoto in view of Tsu does not disclose a spherical pattern. However, Sato discloses (see, for example, column 2, lines 4-7) a spherical pattern as one of many patterns that are formed within a substrate. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use a spherical pattern in order to form a buried pattern that is functional under the surface of a substrate. Also the use of a

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spherical pattern does not provide any critical or unexpected results to the applicant's invention. Rather, it is merely an obvious design choice determinable by routine experimentation. In *Aller*, the court stated, "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In *re Aller*, 220 F.2d 454, 456 105 USPQ 233,235 (CCPA 1995).

12. Claim 66 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. '838 in view of Tsu et al. '420 B1 as applied to claims 62-64, and 67-71 above, and further in view of Yamagata et al. 5,679,475. Yamamoto in view of Tsu does not disclose a monocrystalline substrate. However, Yamagata discloses (see, for example, column 1, lines 51-53) that monocrystalline substrates have good controllability of crystal orientations and less crystal defects. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use a monocrystalline substrate in order to have good controllability of crystal orientations and less crystal defects.

13. Claims 73 and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. '838 in view of Yamagata et al. '475 in view of Sato et al. "A New Substrate Engineering for the Formation of Empty Space in Silicon Induced by Silicon Surface Migration" as applied to claims 46, 51, 52, 54, 55, 60, 61, 72, and 75 above, and further in view of Kenney 5,583,368. Yamamoto in view of Yamagata in view of Sato does not disclose a second buried conductor pattern having a pipe-shaped pattern. However, Kenney discloses (see, for example, FIG. 1g) subsurface structures (for contacts to and connectors between devices) comprising

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trenches (with a pipe-shaped pattern) of varying depths. It would have been obvious to one of ordinary skill in the art at the time of invention to have a second buried conductor pattern having a pipe-shaped pattern in order to form multiple contacts within a semiconductor device and form a more intricate device.

Response to Arguments

14. Applicant's arguments with respect to claims 46-48, and 51-56, and 58-81 have been considered but are moot in view of the new ground(s) of rejection.

INFORMATION ON HOW TO CONTACT THE USPTO

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 703-305-5695. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 703-308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

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Eugene Lee

September 4, 2003

A handwritten signature in black ink, appearing to read 'Eddie Lee', with a large, sweeping initial 'E'.

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800